Palmetto AVIATION

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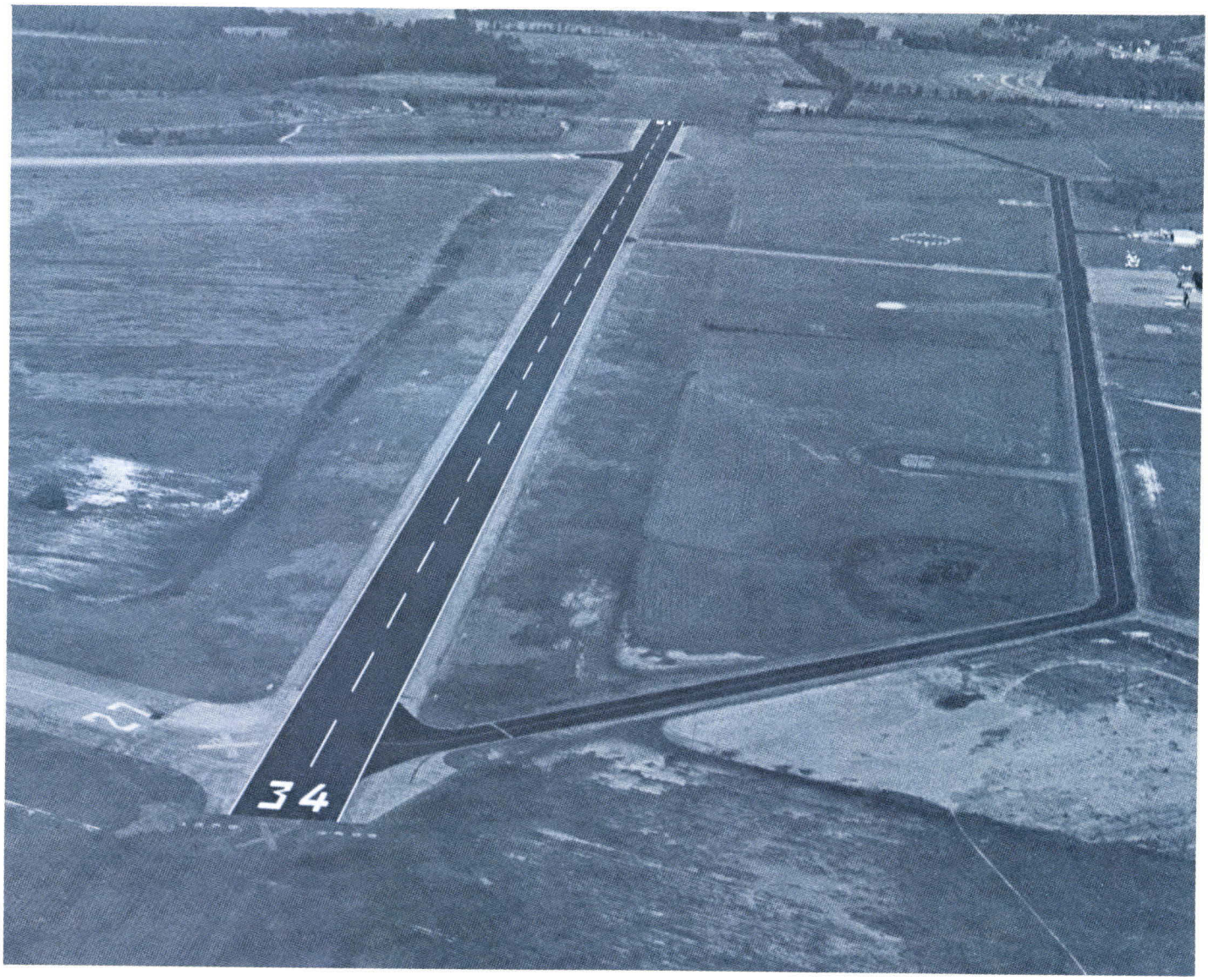

Barnwell runway, taxiway resurfaced

Improvement projects recently completed at Barnwell Airport include asphalt overlay on the primary 5,000 foot runway and parallel taxiway, medium intensity runway lights and security fencing. Total project cost $341,063. The improvements were funded from FAA Airport Development Program (ADAP) grants and state and local funds. State and local governments each contributed five percent of the total project cost. (Aeronautics Commission Photo).

PALMETTO AVIATION is an official publication of the South Carolina Aeronautics Commission. It is designed to inform members of the aviation community, and others interested in aviation, of local developments in aviation and aviation facilities and to keep readers abreast of national and international trends in aviation.

The Aeronautics Commission is a state agency created in 1935 by the S.C. General Assembly to foster and promote air commerce within the state.

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AOPA foundation makes grant to continue Aviation Weather

The Aircraft Owners and Pilots Association and the AOPA Air Safety Foundation recently announced grants totaling $100,000 to the Maryland Center for Public Broadcasting to fund the five-day-a-week "A.M. Weather" program which is televised on more than 227 public broadcasting stations.

John L. Baker, president of both AOPA and the AOPA Air Safety Foundation said the grants will assure the continuation of the program for the 1981 season.

"AOPA pioneered this program and it has been continuously supported by the AOPA Foundation," Baker said. "It had been our intent to reduce the funding as other supports recognized the important role in safety and aviation education this program plays, but when some of last year's small contributors dropped out, AOPA stepped in to make up the difference."

Weather information is essential to safe and efficient flight, the AOPA President said, "and this program serves pilots of all experience levels throughout the nation."

"We are pleased that we and the Federal Aviation Administration continue to support the program as a joint venture with the important contributions from others in the industry," the AOPA president said. Other supporters of the program are: National Business Aircraft Association, Phillips Petroleum Co., United States Aviation Insurance Group, and AVEMCO. Additional major support is provided by National Oceanic and Atmospheric Administration and the National Weather Service.

Excise taxes reduced, cut

Washington, D.C. — At midnight Sept. 30, 1980, two of the aviation related federal excise taxes were reduced and most of the remaining aviation related excise taxes expired, the Internal Revenue Service announced.

The air passenger ticket tax is reduced from eight percent to five percent. In addition, the three-cent user portion of the seven-cents-per-gallon tax on gasoline fuel is eliminated. The remaining four-cents-per-gallon gasoline fuel tax applies to manufacturers only.

The expired taxes are the five percent tax on the transportation of property by air, the $3-per-passenger international departure tax, the seven-cents-per-gallon tax on nongasoline fuels and the aircraft use tax.

The taxes on aircraft tires — five-cents-per-pound — and tubes — 10-cents-per-pound — continue in effect.

A revised Form 720, Quarterly Federal Excise Tax Return, will be made available at a later date to be used for quarters ending on or after December 31, 1980.

Form 4638, Federal Use Tax Return on Civil Aircraft, will be revised to apply for the period July 1 through September 30, 1980, and will be due on January 31, 1981. Forms and instructions will be mailed to affected taxpayers at a later date.

AM WEATHER

Aviation weather can be seen every weekday morning at 7:45 a.m. over the ETV television channels in South Carolina.

The South Carolina Aeronautics Commission encourages pilots to view this 15 minute program before planning a trip. It is an excellent supplement to the FSS briefing.

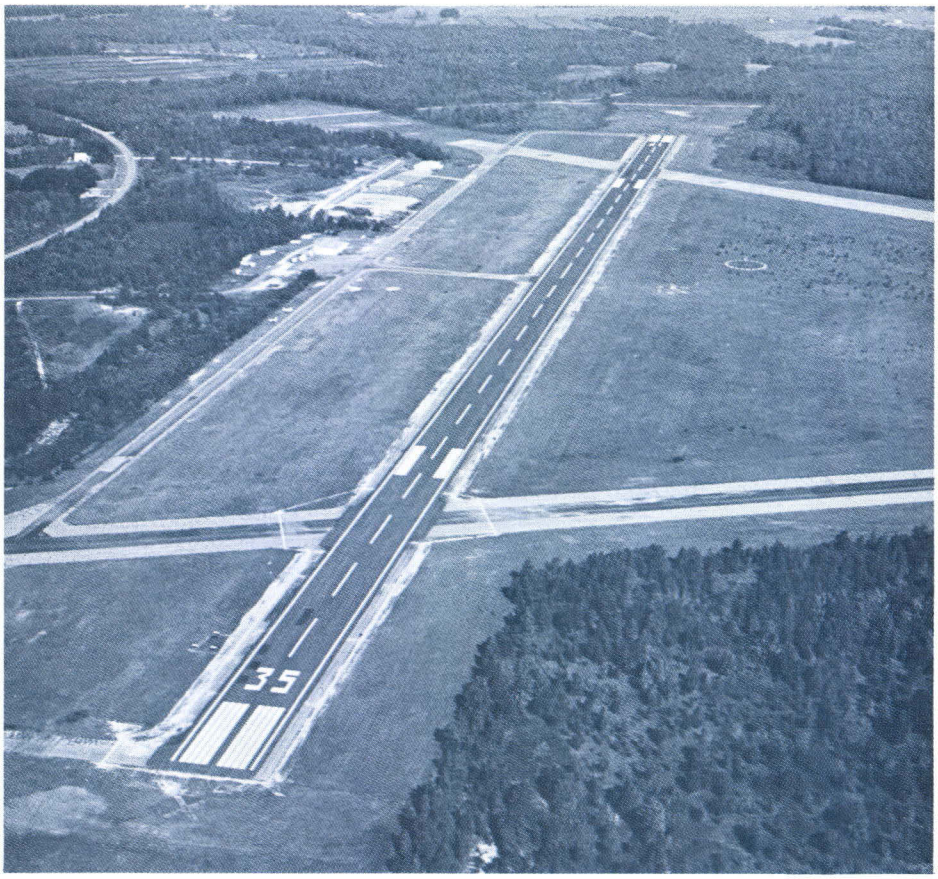
The program is shown over the following channels:

Allendale-Barnwell	WEBA/Channel 14
Beaufort	WJWJ/Channel 16
Charleston	WITV/Channel 7
Columbia	WRLK/Channel 35
Florence	WJPM/Channel 33
Greenville-Spartanburg	WNTV/Channel 29
Rock Hill	WNSC/Channel 30
Sumter	WRJA/Channel 27

GADO hours change

The Columbia General Aviation District Office (GADO) recently changed its business hours to 8:30 a.m. to 5:00 p.m. Monday through Friday.

In the past, the office opened earlier and closed at 4:30 p.m.



Improvements at Chester Airport were completed recently under a 90 percent federal Airport Development Aid Program (ADAP) grant. The $454,504 project included reconstruction of runway 17/35 (5,000 × 100'), installation of medium intensity runway lights, a wind sock and segmented circle. The rotating beacon was relocated. The Federal Share of the project was $409,503. The state and local shares were $22,725 each. The Aeronautics Commission is also assisting the airport on a 50/50 basis with purchase and installation of a non-directional radio beacon. (Aeronautics Commission Photo).

Baker says states must be leaders

John L. Baker, president of the 255,000-member Aircraft Owners and Pilots Association, accused the federal government of a lack of leadership and called on state governments to resolve the air transportation problems in the United States.

Speaking before the National Association of State Aviation Officials in Orlando, Florida recently, Baker said, "It is a national scandal that the Aviation Trust Fund has more than $4 billion of uncommitted funds. The users of the aviation system have been taxed for a decade only to see the federal government confiscate the money to help make the federal deficit appear smaller. There has been money available but there has been no federal leadership."

Baker pointed out that if just the interest on that surplus were spent at the rate of more than a million dollars a day, it would never be necessary to touch the principle.

He said that because there has been no federal leadership, "we must look to the individual states to resolve the air transportation problems."

Baker cited the states for being the leaders in developing airport systems because of their awareness of the proper mix of general aviation and the airlines.

Airport land use varied

The General Accounting Office (GAO) has told Congress that much of the airport land which has been given to states and cities or bought with federal funds, is being used for purposes with only the most remote connection to aviation.

A survey of 72 airports showed land used for industrial parks, private homes, parks, golf courses, a stock car racetrack, sewage lagoons, a dog pound, a bank and credit union, car rental agencies, an animal clinic, a hotel, a beauty salon and farms.

Some of the users hold 20 to 40-year leases, with renewal options up to 60 years. The GAO wants the Secretary of Transportation to order the FAA to take a hard look at airport land and to reclaim it if it is not being used properly.

Most residents oppose Metro parallel runway

Residents of the Cedarwood subdivision, have expressed vocal opposition to a proposed third runway at Columbia Metropolitan Airport and have vowed to fight the addition which they feel will hurt the property value of their homes.

A Master plan study, completed by Wilbur Smith and Associates, predicts the airport will need the third runway by 1987 to handle increased general aviation and commercial traffic. The report says the ideal location, from an air traffic standpoint, is also the most expensive, requiring the relocation of about 250 homes in the Cedarwood, Three Fountains and Churchill Heights subdivision. It would cost an estimated $40 million.

However, the report said there are several acceptable locations that would require no homes to be relocated and would cost as little as $10 million. Some of those alternatives would involve moving Platts Springs Road, or putting it in a tunnel under the runway and relocating a cemetery.

The Richland-Lexington Airport Commission had earlier indicated it would make a decision on the runway location sometime in December. However, Airport Director Bob Waddell said the Commission wants to give the public "every opportunity" to view the alternatives and comment on them. He said the December date is "very flexible."

A series of three public hearings was recently completed in Richland and Lexington County. Reaction from residents who live near the airport has been mostly negative.

Big Sky theory no longer valid;

BY MAJ. JOHN A. MORRIS
Myrtle Beach AFB

The author of this article, Major John A. Morris is a mission ready A-10 pilot assigned to the 353rd Tactical Fighter Squadron. His flying experience includes tours of duty in the C141, T37, and approximately 500 hours of civilian general aviation experience. Major Morris is an Air Force Senior Pilot and possesses Commercial and Instrument civilian ratings.

The "Big Sky" theory is no longer valid.

There once was a time when it was applicable, when the number of aircraft in the sky was so low as to virtually negate the possibility of two airplanes attempting to occupy the same space at the same time. But this is no longer the case — the skies are busy now with aircraft of all shapes and sizes; and, with only a few exceptions, they all have a legitimate right to be there.

Our problem as pilots of those various flying machines is to take off successfully, do our respective thing while airborne, and land without running into any solid obstacles. In some areas of the country, such as the FAA Southern Region, the volume of traffic makes more of a problem than in other areas.

Part of the problem with this area of the country is the heavy population of military aircraft and the numerous training flights that are conducted daily. Not only do they increase the volume of air traffic, thus increasing the potential for mid-air collisions, but they generally fly at airspeeds which are not really compatible with other airspace users. In addition, they can often be found in the low altitude structure off published airways. In short, it is highly probable that the general aviation pilot will encounter numerous military aircraft, hopefully at a distance, as he travels about this area.

As a military pilot, I am very aware of the tremendous mix of air traffic in this section of the country. We in the military are briefed incessantly on the hazards inherent in our flight operations, not the least of which is the potential for mid-air collisions. The solution cannot be to curtail our operations to ensure safety in the sky, because we must train realistically if we hope to have any chance for success in combat.

Actually, the military continues to work closely with the FAA to reduce the probability of mid-air collisions. The majority of our flight operations are conducted within Special Use Airspace in order that our activities do not unnecessarily endanger civilian populace. A short review of Special Use Airspace and definitions emphasizes the extent to which the military has gone to promote safe operations.

Special Use Airspace consists of Prohibited Areas, Restricted Areas, Warning Areas, and Alert Areas. In addition, the military uses Military Operating Areas and Military Training Routes to control further our activities and to advise others of our activities.

Prohibited Areas are used when the danger or security risk is such that absolutely no flight of any kind is allowed without specific permission of the controlling agency. For all practical purposes, the average pilot can forget about flying in a Prohibited Area.

Restricted Areas are used to contain activities which are inherently dangerous to non-participants, but to a lesser degree than in Prohibited Areas. The net effect is the same though — flight within the area is prohibited during published periods of use unless permission is obtained from the controlling agency. However, unlike Prohibited Areas, there is a reasonable chance of being allowed to transit these areas if there is no activity at the time of your request.

Warning Areas are essentially the same as Restricted Areas in that the nature of the activities being conducted is equally hazardous to non-participants. The difference is that Warning Areas are located in international airspace; therefore, the FAA does not have the authority to restrict flight. As a practical matter, though, the average pilot should treat these areas as no-fly areas when activity is in progress.

Alert Areas carry no flight restrictions but merely serve to warn of concentrated student training or other significant unusual aerial activity. While avoidance of these areas would appear prudent, there is no legal reason compelling you to do so.

Military Operating Areas are areas which are set aside for the military to conduct complex training missions safely with minimum risk to non-participants. As a matter of course, aircraft on an IFR flight will be vectored to ensure separation and the areas are clearly outlined on sectional charts to alert VFR pilots of hazards involved with flight through these areas. There is no restriction to flight, but here again it is wise to avoid the area.

Military Training Routes are specific routes of flight used by the military for navigational training. These are not outlined on sectional charts but can be located by reference to the Airman Information Manual. They are primarily designated to warn non-participants of high speed, low altitude military aircraft operations. These routes generally avoid populated areas. All military navigational training missions conducted below 10,000 feet and at an airspeed in excess

owded sky is rule, not exception

of 250 knots must use a Military Training Route.

All of this has been designed with one basic purpose in mind — to provide realistic training to our military pilots with minimum risk to other airspace users. It would be nice if I could tell you that this is the ultimate solution, but unfortunately, I can't. Close encounters between civil and military aircraft occur in spite of all precautions — the only thing that prevents these close encounters from being real disasters is the skill and vigilance of the pilots involved.

Which brings me to the major thrust of this article. What is the ultimate solution? We all know that it is the pilot's responsibility to "see and avoid" and this alone is the key to survival in our busy skies. The ultimate solution hinges on the practical application of this simple concept. My personal opinion is that we don't need further flight restrictions or more complex regulations. In fact, strict attention to compliance with complicated procedures often inhibits our ability to see and avoid.

The first step we all need to take is to familiarize ourselves thoroughly with the risks of each and every flight. It isn't enough to just draw a line on a sectional and study the airport diagram of our destination, oblivious to what lies en route. Pick your route carefully, avoiding population centers whenever possible. The larger the city, the more local air traffic will be in the sky. Note the location of Special Use Airspace and the military bases on your route of flight. Determine what you can avoid and what areas require you to be especially observant.

Another major point to consider is the altitude at which you will be flying. Generally speaking, the higher you fly, the fewer airplanes you will encounter on your route. The search for favorable winds and cloud clearance is an important factor to be weighed, but not the final determinant. It is interesting to note that the majority of "near misses" between military and civil aircraft ocurring in this area have taken place between ground level and 3000 feet. There's a valid reason for this — the military conducts a great deal of extreme low altitude navigation training because of the sophistication of our potential enemy's defenses. The best way for a pilot to avoid this concentration of military activity is to climb as quickly as feasible on initial takeoff to be above it. A couple of advantages derived from this technique, in addition to avoiding an accident, are easier navigation and increased glide range.

There is one basic fallacy to the "see and avoid" concept of operations when it involves mixed civil-military operations. At the airspeeds many military jets fly, it is almost humanly impossible for the general aviation pilot to see them and take timely evasive action, particularly if the pilot is accustomed to flying a relatively slow airplane. For one, the pilot's eyes aren't trained to focus at the distance which would be required for timely evasive maneuvers. For another, most military fighter-attack aircraft are specifically designed to be hard to see. The only solution to this human frailty is for the civil pilot to augment his eyes. If there are other passengers aboard, it is a very good idea to get them involved in looking for other airplanes. I would heartily recommend also that you make it a habit to fully use the services that your tax dollars provide. I'm speaking now of Air Route Traffic Control (ARTC) capabilities to provide flight advisories and/or traffic separation. In almost all instances of "near misses" recorded for this area, the pilots involved had not availed themselves of this valuable service that was there for the asking. Information received could have been used to alert their eyes to a possible conflict, thus avoiding the close encounter.

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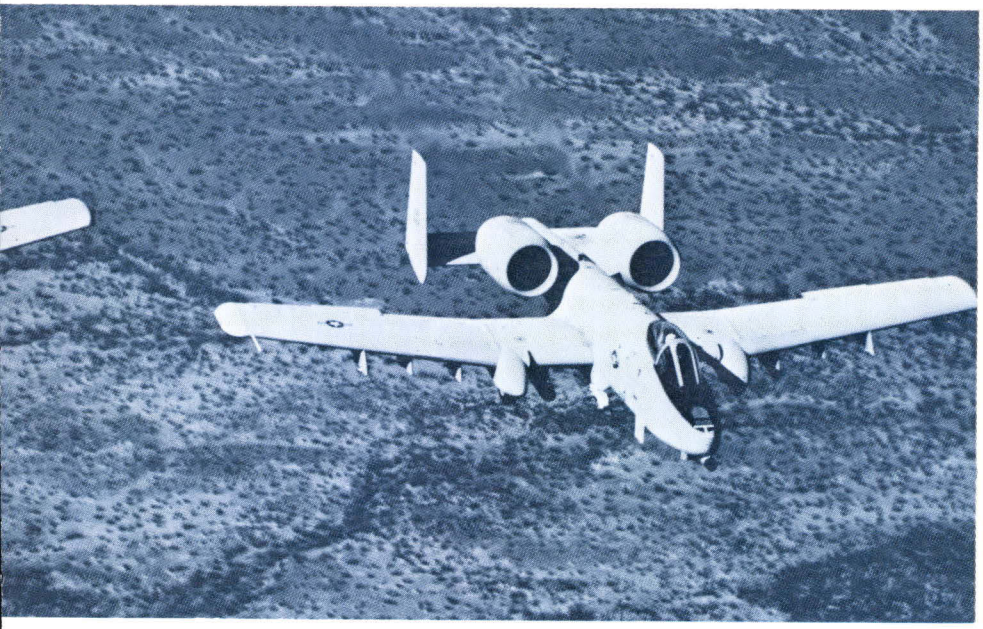

I mentioned at the outset of this article that the "Big Sky" theory is no longer valid. Yet, from reports I have read, it seems that there are a disturbingly large number of pilots who still believe in the theory. To be sure, the chances of hitting another airplane while aimlessly wandering the skies are considerably less than if you attempted to do the same with your automobile, but why take chances at all?

With a little more careful preflight planning, increased attention in the air, and greater reliance on ARTC capabilities on all our parts, the sky can be made safer for all our activities and we can avoid the rash of restrictions which inevitably come about as the result of major disasters.

Shaw fighters, O-2's work coordinated mission

BY CAPT. ROBERT L. ELMORE

In the September issue, maps were published of the Shaw AFB 0-2 Operating Areas. This article will cover a typical mission and the potential for a mid-air collision between a civil and a military aircraft.

The Gamecock Golf/Fox MOA, soon to be known as Gamecock India MOA, is located North and East of Lake Wateree, Northwest of Camden, and South and East of Lancaster. Typically, the Forward Air Controllers (FACs) of the 507 Tactical Air Control Wing's 21 Tactical Air Support Squadron (TASS) practice their tactics of Close Air Support (CAS) in the Gamecock G/F MOA utilizing O-2As (Cessna 337s) while controlling fighter aircraft such as the A-7, A-10, and F-4. While the O-2 flies compatible airspeeds with most civilian aircraft, the fighters fly airspeeds in excess of 400 KIAS. So where can these aircaft be expected? The answer is anywhere within the MOA, from 500 feet AGL to 10,000 feet MSL. The fighters routinely ingress the target at 500 feet at 480-540 KIAS and then pull up to between 4000 and 6000 feet for simulated ordinance delivery patterns.

After the fighters have departed the MOA, usually about 30 minutes, the FAC will depart for the Low Altitude Tactical Navigation Area to practice his navigation skills at altitudes that vary from 100 feet AGL to 1500 feet AGL. During this time the pilot is practicing finding specific points on the ground by referencing roads, earth contour and natural features with his maps.

The FAC will then return to Shaw via Precision Radar Approach which is normally begun at 10-15 miles out from Shaw at 1600 feet MSL. This approach requires precise control and limits the FAC's ability to effectively clear for other traffic.

In conclusion, the O-2's operating out of Shaw and working with the fighter aircraft or other O-2 can be found within any of the depicted working areas or MOAs, flying airspeeds between 100 KIAS - 600 KIAS and from sunrise to sunset. Thus, it is especially important that the civilian pilot is aware of these MOAs and working areas. The best course of action would be to avoid those areas, however, if that is not possible, at least contact the controlling agency to see if they are in use. Usually, Jacksonville Center (Gamecock F/G and B), Shaw Approach (Poinsett and advisories), Myrtle Beach Approach Control (Gamecock C), or the nearest Flight Service Station can tell you if the areas are in use and suggest vectors clear of the area. The controlling agencies, their areas of control and frequency are as follows:

Jacksonville Center	124.7	Gamecock G/F & B
Myrtle Beach Approach	119.2	Gamecock C
Florence FSS	122.2	LATN 1 and 2
Shaw Approach	118.85 or 125.4	R6002 and Advisories

If anyone desires more information on our operations or has questions concerning the MOA's, please call 507 TAIRCW Safety Office at 803-668-2640/3038.

Breakfast Club

The S.C. Breakfast Club met in Orangeburg Oct. 26 for its traditional breakfast and annual election of officers.

Gerald Ballard, of North Augusta, was elected president. Fred Powell, of Greenwood, was elected upper state vice president; David Oswalt, of Batesburg, was named mid-state vice president and Rudy Branham of Darlington was picked lower state vice president. Anne Hawkins, of Camden, was re-elected secretary.

According to Mrs. Hawkins, about 100 people attended the meeting and enjoyed breakfast at Berry's on the Hill in Orangeburg. Many of those attending flew in. There were 36 airplanes in all.

Our meetings are scheduled as follows:

November 9 . . . . . Myrtle Beach, Breakfast at Don's Pancake House
November 23 . . . . . Clemson

Locations of December club meetings have not yet been set. The Club will tentatively meet December 7 and December 21. For the location of the December meeting, call Anne Hawkins at 432-3095. The schedule for the remainder of December and January will be printed in the next issue of Palmetto Aviation.

CAP gets real workout over weekend

The S.C. Civil Air Patrol, participated in a mock exercise last month designed to test reaction of disaster agencies in the event of a natural emergency — such as a hurricane on the coast.

The exercise, called by the S.C. Disaster Preparedness Agency, was held Oct. 18. An emergency Operations Center (EOC) was set up in the Columbia Civil Defense Headquarters and CAP sub bases were manned in Aiken and Moncks Corner.

Operating out of the sub bases, CAP aircraft photographed the coastlines to assess damage, transported blood and medical personnel, did traffic counts on highways leading into damaged areas and checked to see if bridges were washed out. Most CAP squadrons participated in the exercise.

During the exercise, CAP Wing Commander Col. George Compton said the wing also responded to an ELT which went off at the Rock Hill airport (there was no crash) and furnished cadets and senior members to stand guard at a crash site at Columbia Metropolitan Airport.

"If we can prosecute three missions at the same time, that's doing pretty good, I reckon," he said.

Crash injures two at Metro

The pilot of a twin-engine Aero Commander was seriously injured and a passenger slightly injured when the aircraft crashed short of the runway at Columbia Metropolitan Airport Friday night, Oct. 17.

FAA officials said the 680 Commander crashed 2,400 feet short and 1,5000 feet north of the extended centerline of runway 11 at Columbia at 10:22 P.M. The aircraft was destroyed, but there was no fire.

The passenger was treated at Richland Memorial Hospital and returned to his home in Florida Sunday.

Investigation into the crash is continuing.

Misconceptions persist on engine-out performance

The following FAA staff study highlights a widespread misconception within the aviation community concerning single engine performance of twin engine aircraft. The study was furnished by Columbia General Aviation District Office for publication in Palmetto Aviation. Part one is in this issue and the conclusion will appear in next month's issue.

BY LESTER H. BERVEN
Aerospace Engineer/Pilot

THE ISSUE: There is presently a very significant disparity between the actual flight characteristic of twin engine aircraft with one engine inoperative and several erroneous beliefs and hazardous misconceptions which exist within the aviation community. These misconceptions undoubtedly are contributing greatly to the egregious safety record of general aviation multi-engine aircraft and should be immediately and expeditiously eliminated by updating the training and certification of pilots and flight instructors both within and outside the FAA.

BACKGROUND: The problem arises because of a disparity between the concept of air minimum control speed (VMCA) held by operational pilots and that specified in the certification requirements which actually define this speed. Both CAR 3.111 and FAR 23.149 state that:

> "VMC is the minimum calibrated airspeed at which, when any engine is suddenly made inoperative, it is possible to recover control of the airplane with the engine still inoperative and maintain straight flight, either with zero yaw or, at the option of the applicant, with an angle of bank of not more than five degrees."

The underlined portion of the VMC definition was allegedly included because ". . . it is considered a normal reaction on the pilot's part to relieve some rudder pressure by banking."

This may seem reasonable at first glance, but no mention is made of the very large effect of the 5° bank to determine the VMC as possible, he will (and does) always use the 5° bank to determine the VMC marked on the airspeed indicator (or given in the AFM). Flight test techniques used to define VMC consist of determining an airspeed low enough that an engine cut will require an immediate roll into good engine to establish the 5° bank and full rudder deflection will just provide enough control to keep the aircraft from turning more than 20° into the dead engine.

The pilot, on the other hand, has been taught and believes that if his airspeed is at or above VMC, he will be able to control the aircraft if an engine fails as long as he keeps the wings level within 5°. Not nearly enough emphasis has been placed on the vital importance of immediately initiating and maintaining the 5° bank into the good engine. The certificated VMC for a typical light twin is 91 knots; however, actual flight tests on an instrumented aircraft show that if a constant heading is maintained with the ball centered (wings level), the pilot will lose control of the aircraft at 115 knots! The only mention made of this banking technique in FAA training literature is in AC 61-21, Flight Training Handbook where ". . . banking slightly (not more than 5°) toward the operating engine . . . is given as a technique for controlling the aircraft when an engine fails below VMC. In the same manual, further emphasis on VMC as a safe speed is made in the section on short field takeoffs, where the statement is made that: . . . minimum engine-out control speed should be used for climb-out if it is higher than the best angle of climb airspeed, to prevent a serious loss of control in the event of an engine failure after liftoff." This training manual also specifies that the published VMC is established as gross weight, which is untrue.

The FAA Multi-Engine Airplane Class or Type Rating flight test guide (AC 61-4C) makes no mention of banking into the good engine during the VMC demonstration, and the present technique being taught by flight instructors and flight examiners is to require the student to maintain heading with the ball in the turn and slip indicator centered. The reasoning for this is that if the aircraft is at zero sideslip it will have no tendency to spin if inadvertently stalled and that this condition will also result in the lowest drag.

A comprehensive mathematical analysis of the engine-out characteristics of mult-engine aircraft (verified by flight tests), however, show all of these established premises to be dangerously in error. The conclusions resulting from this analysis are:

1. A decrease in weight increases VMC.
2. Moving the C.G. aft increases VMC.
3. An increase in altitude (decrease in power) lowers VMC without significantly

Continued on back page

Exam-O-Grams no longer free

Those useful FAA Exam-O-Grams, which have historically been available free of charge, have fallen victim to inflation and will now start costing you.

In a recent advisory circular, the FAA said that escalating printing and postage costs no longer permit the free distribution of the material.

Instead, it said, the Exam-O-Grams will be available on a subscription basis from the Superintendent of Documents or from GPO bookstores located in major cities.

Cost of the subscription for both VFR and IFR Exam-O-Grams is $13 in the U.S. and $16.25 if mailed overseas. Changes will be mailed automatically to subscribers covering a three year period.

To order write: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Make check or money order payable to Superintendent of Documents and specify:
Title: IFR and VFR Pilot Exam-O-Gram
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Aviation Calendar

Nov. 6:
Safety Meeting, Aiken Airport, 7:30 p.m.

Nov. 17:
Safety Meeting, Greenville TEC Auditorium, 7:30 p.m.

Dec. 4:
Safety Meeting, Greenville TEC Auditorium, 7:30 p.m.

SOUTH CAROLINA
AERONAUTICS COMMISSION
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Columbia, South Carolina 29202

Misconceptions

Continued from page 7

changing the stall speed, indicating that for most all light twins, there is some weight/altitude combination where VMC and VS are the same. For the sample, this crossover occurs at half fuel, mid C.G. and 3,000 feet — the exact condition at which most multi-engine VMC training demonstrations are performed.

4. The reason banking into the good engine lowers VMC is that it increases the sideslip angle and the resulting stable yawing movement reduces the rudder deflection required.

5. Decreasing the bank angle away from the good engine increases VMC at the rate of 3 knots per degree of bank angle.

6. In an engine-out condition in stabilized flight with a 5° bank into the good engine, the pilot cannot choose the sideslip angle and in fact has no way of knowing what it is without a calibrated sideslip vane or yaw string.

7. In unaccelerated flight, the ball is really a bank indicator and gives no information about sideslip angle. The pilot therefore cannot intentionally fly the aircraft at the minimum drag condition of zero sideslip (or minimum sideslip). On the other hand, the single-engine climb performance shown in the AFM is based on zero sideslip and is obtained by using an instrumented sideslip indicator.

8. At zero sideslip, the ball will have a large deflection toward the good engine.

9. With the wings level and the ball centered, the aircraft will be in a moderate sideslip into the dead engine.

10. If the pilot inadvertently or instinctively tries to hold the wings level in an engine-out situation, VMC can increase as much as 20 knots. The aircraft could be uncontrollable at a speed as high as VYSE. This situation will exist if the pilot tries to maintain heading with the ball centered!

As an example of how the pilot's training and the reality of engine-out flight characteristics interact negatively, consider the following:

The pilot of a fully loaded light twin is planning a takeoff from a typical general aviation airport 3,000 feet long, with a light and variable wind. Being a professional pilot, current in all the latest techniques, he conscientiously checks his performance charts and reviews his critical airspeeds. His AFM shows that it requires 2,000 feet to clear a 50-foot obstacle under the existing conditions, that VMC is 80 knots, recommended VR is 85 knots (VMC + 5) and that to achieve the performance shown in the manual, he should be at 91 knots at 50 feet. Since he is taking off at gross weight, he checks single-engine climb performance and finds that even in the improbable event of an engine failure, he would still have 250 FPM positive rate of climb, more than adequate performance to make it to the nearby metropolitan airport. He decides that since there are no obstacles at the end of the runway, he will make the initial climb at the blue line speed (single-engine best rate of climb) of 100 knots just to be extra safe. He then checks the weight and balance, finds it to be within limits, and proceeds to conduct a thorough preflight inspection of the aircraft. Satisfied that everything is in order, he and his passengers board the aircraft. Runup checks are normal and on takeoff he lifts off at the recommended takeoff speed, accelerates to the recommended single-engine climb speed of 100 knots (20 knots above the marked VMC) and is just reaching for the gear switch when the left engine fails, resulting in the instantaneous loss of 100% of his available climb/acceleration capability. With the left engine windmilling and the gear still down, at the original climb angle, the airspeed will be decreasing at the rate of 3 knots per second. Assuming the pilot does everthing exactly by the book — right rudder to hold healing, wings approximately level, check maximum power, gear up, check flaps up, identify the dead engine, verify by reducing that throttle, feather the dead engine, maintain heading and altitude — the air speed will have decreased a minimum of 10 knots since it takes 4 seconds for the gear to come up and then 8 more for the pop to feather. With the airplane cleaned up, dead engine feathered, holding a constant heading with the ball centered, the pilot will rightly expect the aircraft to be climbing 250 FPM. At this point he will have two tragic and fatal surprises. The aircraft will not climb, but instead will be descending and/or losing additional airspeed and the right rudder pedal will be full against the stop with the aircraft turning left into the dead engine; all this at an indicated airspeed which is still 10 knots above the marked VMC!

The pilot's two problems are closely related: when he chose to maintain heading with the ball centered, the aircraft entered a sideslip into the dead engine, thereby raising the directional minimum control speed 10 knots more. The aircraft is now slipping into the dead engine with full rudder deflection, a very high drag configuration, far different than that used to define the AFM single-engine climb performance. Additionally, a decrease in airspeed of only 5 knots from VYSE will completely eliminate any climb performance, and he has no hope of accelerating back to 100 knots in his present configuration, only 50 feet above the ground. The pilot has only one chance of survival: he can reduce power on the operating engine, maintain 90 knots and crash straight ahead. Most likely, however, the pilot will continue with shocked disbelief trying to hold altitude until the aircraft stalls and spins or builds up an unsurvivable sink rate and crashes into the ground anyway.

Continued next month.